

**【CLAIMS】**

**【Claim 1】** A hybrid power supply system for driving a discharge lamp, the hybrid power supply system comprising:

5 a rectifier/filter having an input terminal connected to an external AC voltage, the rectifier/filter converting the external AC voltage to a DC voltage;

a piezoelectric inverter connected to the rectifier/filter, the piezoelectric inverter stepping up and converting the DC voltage to an AC voltage for driving the discharge lamp; and

10 a ferrite converter connected to the rectifier/filter, the ferrite converter stepping down the DC voltage to a rated DC voltage for driving discharge lamp circuits other than the discharge lamp,

the piezoelectric inverter including:

two first switching circuits having respective input terminals and a common output terminal;

15 a driver circuit electrically coupled to respective control input terminals of the first switching circuits, the driver circuit driving the first switching circuits;

at least one piezoelectric step-up transformer having a primary side electrically coupled to the common output terminal of the first switching circuits and a secondary side electrically coupled to the discharge lamp;

20 a sampling circuit electrically coupled to the discharge lamp, the sampling circuit detecting a current value of the discharge lamp and outputting a feedback signal;

25 a comparator circuit electrically coupled to the sampling circuit and a frequency control circuit, the comparator circuit comparing the feedback signal with a predetermined reference signal; and

the frequency control circuit electrically coupled to the comparator circuit and the driver circuit, the frequency control circuit controlling a switching frequency for the switching circuits according to an output signal of the comparator circuit,

30 the ferrite converter including a ferrite step-down transformer and a rectifier circuit,

the ferrite step-down transformer having a primary side electrically coupled to the output terminal of the switching circuits and a secondary side electrically coupled to the rectifier circuit,

5 the rectifier circuit electrically coupled to the secondary side of the ferrite step-down transformer.

10 **【Claim 2】** The hybrid power supply system according to claim 1, wherein the primary side of the ferrite step-down transformer is electrically coupled to the common output terminal of the first switching circuits and the respective input terminals thereof.

**【Claim 3】** The hybrid power supply system according to claim 1, wherein the primary side of the ferrite step-down converter is electrically coupled to the common output terminal of the first switching circuits and the primary side of the piezoelectric step-up transformer.

15 **【Claim 4】** The hybrid power supply system according to claim 1, further comprising an additional AC-DC circuit electrically coupled to an input-side AC circuit, the comparator circuit, and the frequency control circuit.

20 **【Claim 5】** The hybrid power supply system according to claim 1, further comprising an additional DC-DC circuit electrically coupled to an input-side AC circuit, the comparator circuit, and the frequency control circuit.

25 **【Claim 6】** The hybrid power supply system according to any one of claims 1-5, wherein the ferrite converter further includes a buck regulator electrically coupled to the rectifier circuit.

**【Claim 7】** The hybrid power supply system according to claim 1, wherein the ferrite converter includes:

30 a second switching circuit electrically coupled to the ferrite step-down

transformer, the second switching circuit driving the ferrite step-down transformer;  
and

a secondary regulator circuit electrically coupled to the second switching  
circuits and the rectifier circuit, the secondary regulator circuit feeding an output  
5 voltage of the rectifier circuit back to the second switching circuit.

**【Claim 8】** The hybrid power supply system according to claim 1, wherein the  
comparator circuit is electrically coupled to an external brightness control signal.

10 **【Claim 9】** The hybrid power supply system according to claim 1, wherein the  
piezoelectric step-up transformer includes a Rosen type piezoelectric transformer,  
a ring type piezoelectric transformer, or a ring-dot type piezoelectric transformer.